

MEDICAL IMAGE FUSION

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Modern imaging techniques have now become important component to facilitate correct diagnosis or treatment planning. Single modality whether it will be CT, MRI, PET, X-RAY, SPECT provide limited information about the patient. Some modalities reveal anatomical information, some reveals functional and some tells about soft tissues. So there is a need to integrate the different modalities that can be useful in proper diagnosis in many cases. There are two steps to integrate the two different modalities [1,2]. First step is geometrical matching or registration and second is image fusion. Geometrical matching is already well established field of research. But here we will only concentrate on image fusion. Image fusion is

playing a crucial role in remote sensing, computer vision, robotics beside medical image fusion. Medical image fusion is hot topic of research now days.

Lot of research have been conducted on medical image fusion in the last ten years but still some renowned researchers still thinks that there is scope for more. There are lots of applications of medical image fusion; some of them are listed here (1) PET-CT fusion for lung cancer(2) MRI-PET fusion for brain tumors(3) SPECT-CT fusion for abdominal studies(4) MRI-CT fusion for planning surgical procedure (5) SPECT-MRI fusion for abnormality localization patients with tinnitus. Image fusion is broadly categorized into three levels (1) pixel/signal/data level (2) feature/region/attributes level (3) Decision/symbolic level. Pixel level is lowest level of fusion and widely operates in medical image fusion because it operates directly on the raw data & said to be computationally efficient.

Plethora of algorithm has been developed on image fusion in the last decade. Since it is well known that lot of efficient and effective methods have been developed in the last ten years but it is better to consider the recent techniques during last 4-5 years. In 2011, multi focus image fusion technique based on bilateral gradient sharpness criterion is proposed by Jing Tian & his co researchers [3]. In 2012, Jian Tian & Li chen proposed a multi focus image fusion method based on wavelet statistical sharpness measure [4]. In 2013, fusion technique using cross bilateral filter is proposed by B.K. Shreyamsha Kumar[5]. But a most revolutionary image fusion method based on cross scale coefficient selection is proposed by Rui shen and his co researchers in 2013 [6] & claims that his proposed method is efficient than the existing one.

RESEARCH GAPS:

In paper [6], Dr. Rui shen and his fellow research workers claims that there is no formation of artifacts in the fused results. Formation of artifacts cannot be fully avoided but it can be reduced. Amount of formation of artifacts can be calculated by objective evaluation metrics where as author does not done any such evaluation. Secondly the author does not evaluate the loss of information from source images to fused image. These are the mere drawbacks that I would like to investigate in our research work and like to go for the future enhancement of the cross scale fusion rule.

CONCLUSION:

Still there is scope for medical image fusion. I would like to investigate the issues in cross scale fusion rule and also work for future enhancement of cross scale fusion

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